IPVS2022

26th international pig veterinary society congress - rio de janeiro - brazil

June
21st-24th

Proceedings IPVS2022

RIO DE JANEIRO/RJ, BRAZIL

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Experimental model: reproduction of erysipelas in pigs

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Introduction

The bacterium *Erysipelothrix rhusiopathiae* (ER) is endemic in swine farms. In immunosuppression situations, infection by this agent causes swine erysipelas, a systemic disease that induces significant economic damage to producers and industries, because of reproductive losses, carcass condemnation, animal deaths, drug costs and losses in zootechnical indices. The use of vaccines is one of the main tools of controlling the disease. The objective of this work was to standardize an experimental model for reproduction of erysipelas in pigs, an important method to evaluate the efficacy in future vaccine and medicines development, besides strain pathogenicity tests.

Materials and Methods

Twenty three specific pathogen-free pigs, negative for ER by PCR (2) and for anti-ER antibodies by Elisa (CIVTEST® SUIS SE/MR, HIPRA), were divided into: T1) 8 pigs challenged at 70 days of age with 10^8 Colony Forming Units (CFU) of ER per pig; T2) 8 challenged at 70 days with 10^7 UFC; T3) 1 pig inoculated with Feist broth at 70 days (negative control); T4) 6 challenged at 90 days with 10^7 UFC. The challenge was performed via dorsal intradermal injection, after shaving, with 0.1mL of cultured strain BRMSA 0558, from Embrapa's Collection of Microorganisms of Interest for Swine and Poultry (CMISEA). The pigs were then evaluated daily for survival, rectal temperature, diameter of skin erythema at the inoculation site and presence of disseminated lesions, for a period of 4 days for those challenged at 90 days of age and 7 days for those challenged at 70 days. Afterwards, they were euthanized by electrocution followed by bleeding and then necropsied for macroscopic evaluation and samples collection for laboratory tests aiming the isolation and characterization of ER (1, 2, 3) and for histopathology analysis and ER detection by immunohistochemistry (IHQ). Animals that were suffering were immediately euthanized.

Results

There was no natural death of any pig. The unchallenged pig (T3) did not show any alteration. It was possible to observe clinical signs and lesions in more than 80% of the challenged pigs. The skin lesions started with erythema at the inoculation site 1 day post inoculation (dpi); increase in lesion diameter by 2 dpi; disseminated multifocal lesions between 3 and 6 dpi and at 7 dpi the lesions became less evident.

In challenged pigs there was reisolation of the ER BRMSA 0558 strain from the skin culture (100%), feces (95.5%), blood and liver (9%) and from the spleen (4.5%). All pigs had histopathological skin lesions compatible with ER infection, which ranged from areas with mild to moderate inflammatory infiltrate in the dermis and subcutaneous tissue, hyperemia of the dermis and subcutaneous tissue, foci of hemorrhage, fibrin thrombi, and areas of necrosis in the dermis and epidermis. In some challenged pigs, discrete alterations compatible with septicemia were observed in the spleens and livers, such as mild to moderate infiltration of neutrophils in the red pulp and mild leukocytosis in the sinusoids, respectively. The IHC for ER of the skin samples was positive in 70% of the challenged pigs and the most evident staining was observed in the samples collected before 7 dpi, results are presented in Table 1.

Table 1. Percentage of pigs with clinical signs, lesions and positive laboratory assay for ER

Treatment	T1	T2	T3	T4
Number of Animals	8	8	1	6
Elevated T°C* (%)	87,5	87,5	0	83,3
Focal skin lesion (%)**	87,5	87,5	0	100
Disseminated skin lesion (%)	75,0	87,5	0	83,3
Skin - ER isolation (%)	100	100	0	100
Skin - ER compatible histopathology (%)	100	100	0	100
Skin - positive IHQ (%)	75	37,5	0	100

*Temperature above 40.5 on at least one day post challenge;
**At the inoculum injection site;

Discussion and Conclusion

The proposed experimental model allowed the reproduction of the disease in pigs without corticosteroid treatment, at different challenge ages tested and in the two concentrations of inoculum studied, being able to be used for tests of vaccine protection, medicines efficacy and strain pathogenicity.

References

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